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Providing Risk Information in Communities: Factors Influencing What Is Heard and Accepted

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Risk Communication Is a Complex Interaction

This paper argues that risk communication is not simply a one-way transfer of information. Nor is it a single, discrete event. Rather, risk communication is a process involving interaction over time between senders and receivers of information about a risk. This dynamic view of risk communication, derived from our research on cases of chemical contamination of drinking water, carries important practical implications: If risk communication is interactive, then those who would inform others about risk should take into account the concerns and priorities of the recipients of the information.

Our analysis is based on case studies of more than a dozen non-metropolitan communities where toxic chemicals had recently been found in groundwater at contaminant levels high enough to require closing of public or private supply wells. Most of the cases selected for study involved contamination by industrial chemicals, with a subset of six cases with the same contaminant—trichloroethylene (TCE). We also selected a few cases in which

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the contaminants were agricultural chemicals or petroleum products. For logistical reasons, we selected most cases within New York state, but to gain some indication of state-to-state variation in approaches to risk management, we also included three cases in Maine.

At each research site, we studied the chronology of events following the discovery of toxic chemicals in local groundwater; the decisions, actions, and reactions of local officials and community residents; and the institutional participation of federal and state officials and outside technical experts. While some case studies involved only brief retrospective research, in most instances we undertook many on-site visits, often spanning more than two years. In-depth interviews with both local decisionmakers and state and federal personnel were supplemented by informal discussions with local residents, attendance at public hearings and meetings, monitoring of local newspapers, careful researching of public documents and reports, and collection of background information on the community. This diversity of information sources, combined with the diversity of our disciplinary backgrounds (toxicology, cultural anthropology, organization behavior and public policy), assured a breadth of coverage at each site. This case study research strategy has produced observations that are essentially exploratory and qualitative; the patterns we have identified will become hypotheses for testing more quantitatively in future research efforts involving larger samples.

From our research, we would emphasize that the process of risk communication is complex and interactive, involving messenger, message, and receiver. Since we find that the role of the receiver has been neglected, both in analysis and in the practice of risk communication, the main part of this paper is devoted to summarizing what our case studies reveal about the active part that receivers play. Our objective is to identify factors that influence receivers' acceptance of the information provided to them about the health risk posed by chemical contamination of their drinking water supply. Although our analysis lacks the precision that would enable us to predict that x factor

will cause *y* reaction in the receivers, our identification of factors influencing receivers of risk information shows that receivers are not acting without reason or totally unpredictably when they respond to a risk message in a way that is different from what the messenger expected or desired.

The Receiver

People's reception of the risk information is partially shaped by their perceptions of the responses of people around them. Although ultimately the receivers of the risk information are individuals, each person is embedded in a social surround that shapes his or her individual reception of the information. Our analysis of risk perception therefore focuses on the community of receivers of risk information, rather than on individuals—as do many psychology-based risk perception studies.[1]

Overall, we have found that the reception of risk information varies from community to community, within a community, and through time. Even if the risks themselves are similar and the risk information is very similar, as in several of our cases, the information may be perceived and accepted quite differently by different receivers in different communities at different times.

Different Reception in Different Communities

We found considerable variation from one community to another in perceptions of and responses to similar risk situations.[2] In some communities, when people were given information that their water contained chemical contaminants, they became very anxious, were highly vocal about their concerns, and actively pressed for more information, assurances, and protection. In other communities, citizens and their local officials and institutions seemed to downplay the risk, discounting the hazards about which they were told and exhibiting more concern about the technical and financial aspects of the contamination problem. It is important to note that this variation existed despite the fact that the contaminant, the contaminant level, the exposure, and the risk posed were approximately the same in several of the communities. Two sets of factors appear to underlie the intercommunity variation: (1) factors in the discovery of the problem and the initial response by officials, and (2) factors in the local community context.

The events surrounding the discovery of the contamination explain some of the observed variation in local response. In communities where residents themselves first suspected a problem and had to call it to the attention of officials, the risk information subsequently given to them by the officials was perceived as an understatement of the real dangers or even as a "whitewash." In contrast, in cases where the contamination was first discovered in the process of routine testing and where residents themselves had no reason to suspect a problem, public reaction to the announcement of the chemical contamination and information on possible health risks was more calm.

Subsequent to the initial discovery of contamination, the timeliness and willingness with which the information is delivered to the public affects reception of that information. When the contamination becomes known, many residents want specific information about the contaminating agent, the possible health effects, and the actions being taken to protect people. If residents have to plead and argue to obtain this information, if they have to beg the authorities to do water tests and repeatedly ask them to report the results, if it takes months of public pressure to obtain answers to their questions, then citizens become predisposed to doubt the information that is eventually given to them. They become skeptical, believing that the officials are not telling the entire story and that the situation is far worse than the official version. In addition, they are apt to exaggerate the health risk posed by the particular contaminant at the level actually found in their water supply. On the other hand, if the requested information is forthcoming quite soon after the discovery of contamination and if it is provided voluntarily by the authorities, this situation gives the appearance that the people in charge know what they are talking about, are being open and honest with the public, and are caring. The risk information presented in such cases is more readily accepted at face value.

Aspects of the local context comprise the second set of factors affecting reception of risk information. Local factors are important because contamination of water supplies by toxic chemicals does not occur in a vacuum. It is embedded in the larger context of a local community. Analysis of our case studies reveals several local context factors that appear particularly important in shaping the reception of risk information by a community of receivers.[3] The context factors we have identified do not all operate in all communities and do not have a uniform effect in all cases; but they do seem generally to serve as filters between the providers and receivers of information.

Other concerns facing the community

The level of anxiety a community exhibits about the public health risk from groundwater contamination depends in part on local conditions at the time of discovery of the problem. Other concerns on the minds of officials and citizens may cause them to underestimate the seriousness of a health risk or to overestimate or exaggerate the risk about which they are told.[4] Some of the concerns affecting reception of the risk information involve general quality-of-life issues. In one community, where encroaching urban sprawl and urban problems were major concerns, residents responded more intensely than the risk assessment facts might have warranted; their perception was that another evil of the city was catching up with them. The current economic well-being of the community can also affect reception of the risk information. In another community the need to safeguard local jobs out-

weighed concerns about a relatively low-level (one in 100,000) lifetime cancer risk.

Attitude toward local government

The trust people have in local political institutions and officials may determine the level of trust they place in the information local officials provide about a risk. In one community, a trusted mayor and village trustee appointed a citizens advisory committee, which provided families with information through a question-and-answer section in a special newsletter delivered to each village home.[5] Risk information provided by experts through this channel of trusted local officials and citizens was accepted by local residents as effective in addressing their health concerns and helping them to understand the contamination problem. By contrast, in a community where trust in local government is minimal, we found active, highly vocal people pressing their local officials for more information about the health risk but challenging nearly every statement these officials made. Believing that the local officials had underestimated the health risk (perhaps purposely to keep the issue quiet), residents turned to outside sources for information about the risk. In several communities, a perceived lack of openness and honesty on the part of local officials in informing the public about the risks to which they are exposed led to their ouster in the next election.[6]

Attitudes toward state and federal agencies

Attitudes toward state and federal governments also affect local perceptions of the risk and of the information these agencies provide. Where there has traditionally been a strong preference for local control or where state or federal agencies have generally been suspected or disliked, risk information provided by state and federal officials may be regarded as less "true" than what people hear from their local officials or from each other. Risk statements provided by officials of the Environmental Protection Agency in some of the communities we studied were distrusted because the agency had gained a negative image for slow bureaucratic handling of the investigation and remediation of contamination problems, either locally or in nearby communities. Similarly, risk information provided by the New York State Department of Environmental Conservation was sometimes discounted by receivers because it came from an agency that is often negatively perceived as a policing agency. An agency's regulatory functions may thus undermine its effectiveness as a provider of risk information. However, negative attitudes toward state and federal agency statements about risk are neither universal nor insurmountable. In some situations individual state or federal personnel, working interactively and openly at the local level, can maintain trust or even overcome a foundation of distrust.

Local identity and community self-perception

Another important local context factor that acts as a filter for risk information is the community's image of itself and of its future, the "personality" that residents believe their community has, and the future scenarios they implicitly hold about it. For example, in one small city that residents think of as "rural" and "small town," people failed to become aroused about chemical contaminants in their groundwater; they seemed to believe that pollution is an urban ill and that rural environments such as theirs are, by definition, pure. Communities that lacked a clear self-image before toxic chemicals were discovered may respond with considerable anxiety when informed about contamination. Having a local identity suddenly crystallize around the discovery of toxic contamination is a negative way to achieve an identity and may predispose residents to react to the risk information with distrust and to the information provider with anger.

Attitudes toward presumed polluters

Local attitudes toward suspected sources of contamination affect attitudes toward the risk and the information about the risk. If a potentially responsible party is regarded as a member of the community, as "one of us" or a neighbor, statements about health risks from that source may be minimized by the hearers. In one community where manufacturing provides local identity and pride as well as jobs, people seemed to take it in stride when informed that chemicals from some of the factories could have migrated into the water supply; consequently, they paid little attention to the information they received on potential health effects. It was clear that this attitude was separate from and additional to economic dependency on the polluting facility. If, on the other hand, the facility is regarded locally as an outsider, then the risk information may be distorted by the receivers in the direction of overestimating the hazard.

Different Reception by Different Publics in a Community

Although our research is concentrating on intercommunity differences, we also noted intracommunity differences in perceptions of the risk information. We found that prior affiliations and antagonisms within the community explain at least some of the differences in people's interpretation of and response to information about the health risk from water contamination: Alliances formed during earlier controversies form the ground on which the new risk situation falls. Earlier divisive issues, such as growth versus no-growth, tended to foster polarization around the groundwater contamination issue, leading to differential reception of the risk information that was provided.

Differing receptions of risk information also arise because of individual receiver inputs that act as a set of filters for risk messages. All individuals bring to the risk communication process their own individual personalities and perceptions of risk.[7] They also bring a background of prior and contemporaneous experience and knowledge. These receiver inputs of experience and knowledge will act in conjunction with individual characteristics to affect their perception of the risk information.

Individual experience

Among the most relevant individual experiences are people's perceptions of their present state of well-being. If individual hearers of a risk message have recently experienced undefined, unexplained, or unfamiliar health problems, they latch onto this new information as the long-sought explanation of their perceived illness. They may distort the information they are given, overestimating the harmfulness of the contaminants. They may suspect that the information has been deliberately softened and that the truth is being withheld from them. In contrast, where people have not experienced any unusual health problems, the risk information is apt to be received more calmly, the existence of a risk may be openly doubted, and official risk messages dismissed as overly cautious.

Perceived disruption in residents' daily lives resulting from the hazard will also affect the way they receive, process, and modify a message about the health risks. The most obvious disruptions encountered by people with contaminated water include the need to boil drinking water, to obtain water elsewhere, and to go somewhere else to take a shower. But people's sense of the seriousness of the health risk may also be heightened by less obvious disruptions, such as frequent visits by engineers and health officials to test the water or to provide containers of "safe" water.[8] In such situations people are apt to exaggerate the risk they are told about and to criticize the risk information they are given as understating the danger.

Other aspects of individual experiences that appear to affect reception of risk information relate to the American cultural reliance on the individual's own perceptual senses.[9] People filter risk information provided by others through the sensory evidence that they themselves have already gathered about the situation. If people have seen, tasted, or smelled something different about their water, whether or not the change is related to the contamination, they tend to exaggerate the risk. But if their own senses have given them no clue that a problem exists, people may feel that the risk they are being told about has been exaggerated.

Knowledge

The risk information that is presented may be rejected, accepted, or modified on the basis of the concepts and knowledge people already have.[10] If the conceptual anchor

that people bring to a risk communication interaction is strongly held, then new information about the risk is unlikely to be accepted unless it confirms or does not deny what the receiver already believes. In one community where a survey was conducted specifically to determine people's relevant knowledge, it was found that many respondents, while understanding the expression "one chance in a hundred thousand," had misconceptions about the term "parts per million." Furthermore, most could not define "groundwater" and had many misconceptions about the term.[11] The combination of lack of basic concepts and inappropriate anchors reduced their ability to understand the information presented to them.

Collective Interpretations of Risk Information

In spite of differences in individual experiences and perceptions within a community, collective interpretations of the risk may develop and will often override individual experiences. If many people in the community perceive that a health problem exists and that it may stem from the water contamination, this interpretation of reality may become accepted by others even if they themselves have not personally experienced any problems. Public opinion may eventually coalesce around the prevailing viewpoint that the water poses a serious health risk. But where the dominant interpretation is that the risk is not serious, those few individuals who have actually experienced worrisome health problems are not likely to express their anxiety in public; if they do publicly express their fears, their anxiety may be downplayed—even ridiculed—in local media. Individual differences that exist in the interpretation of the risk information and in the level of anxiety about the risk are often masked in public meetings because of the strength of prevailing, accepted interpretations.

Vicarious experience—experience known only indirectly to the individual—also forms part of the collective interpretation. If people perceive an unusually high and localized clustering of medical problems (miscarriages, cancer, birth defects) among their neighbors, this vicarious experience of health problems may be strong enough to override official statements that the medical problems occurring locally could not possibly be caused by the particular contaminants. Vicarious experience also affects the way that community leaders respond to risk information when leaders in one community hear about similar risk situations elsewhere. When a state or federal agency supplies information about a local risk, the information may not be fully believed or trusted by local leaders because of what they have learned from the intercommunity grapevine.

Change in Perceptions of Risk Information over Time

People's reactions to the risk and to the information provided about it (what it is, how serious) may change

over time. In many of the cases we studied, there was a long time period between the discovery and announcement of a risk situation and its resolution—in most cases, more than five years. During this period, individual and group perceptions of the health risk underwent change, even though the risk and the information presented about it remained essentially the same. We found that the initial perceptions formed by individuals when the situation was new (as reflected in their public comments, newspaper interviews, etc.) were likely to be modified over time. The initial shock value of information about a health emergency seemed to lose its compelling urgency for many residents as the investigation and resolution of the groundwater contamination problem dragged on through the years. Frequent and often mechanical repetition in the media of phrases such as "suspected carcinogen" or "carcinogenic in mice" seemed eventually to lose their impact.[12]

Over the time period of our studies, we found that people's perceptions of the risk were affected by their perceptions of the way in which the risk was being handled. When people think the problem is being managed responsibly and expeditiously, little concern is exhibited about the risk information they are given: They seek no more information; they do not go to other sources for confirmation or disproof. But when people feel that the agencies involved are not moving adequately to protect their health and ensure future protection, those who were not originally very concerned about the risk may grow more concerned as time goes by, often becoming quite certain that they are being given inadequate or misleading information about the risk.

The Messenger

As we move from the receivers to the providers of risk information, it is important to point out that our analysis still retains the "bottom-up" perspective of our research. We focus here only on those facets of the messenger that affect the reception of the risk information.

Multiple Messengers Providing Risk Information

In a single contamination setting, risk information may be provided by multiple messengers, a fact that has not been sufficiently recognized either in analytical discussion of risk communication or in actual situations. The various messengers can be grouped into two types: (1) official messengers, and (2) unofficial messengers.

Official messengers may come from a variety of agencies and from different regional offices, levels, branches, and divisions within each agency. The various messengers of a given agency are by no means interchangeable actors, for each may have different jurisdictions, different institutional objectives, different modes of operation, and different constraints. When a community is given risk information by several different official messengers, problems of

confusion and doubt may arise: The receiver is left wondering which one to listen to. Doubt is especially apt to grow in the minds of the receivers if the official messengers, experts who are supposed to know the facts, give conflicting or contradictory information about the risk.[13]

Unofficial messengers play an important role in disseminating risk information in the community, although their role is seldom explicitly recognized. Unofficial messengers would include such diverse individuals and groups as the water-meter reader, the water-purifier salesperson, outside engineers brought in to conduct the technical investigation, unofficial local opinion leaders, the media (local and national), and networks of relatives and neighbors. These unofficial messengers may provide information that is similar to or quite different from the information provided by official messengers; they may communicate "facts" that are essentially accurate or quite inaccurate. They may faithfully transmit the information provided by official sources, or they may unwittingly or purposely distort the information. But regardless of the accuracy of their information, these unofficial messengers may have as much credibility with the public as official messengers: In fact, they often enjoy greater credibility.

Different Perspectives on Risk Held by Various Messengers

Even though the providers of risk information are presenting factual information, the "facts" they choose to present and the manner of presentation may be determined by many subtle influences. Each messenger operating in the community is an individual with his or her own personal attitudes and perspectives about risk. Messengers are also products of institutions, and as such they have internalized the assumptions and biases about risk that characterize the discipline in which they were trained and the firm or agency for which they work. Both personal and career influences contribute perspectives on risk that shape the way the information provider perceives and talks about the particular risk at hand. Each messenger selects, interprets, and emphasizes data that most closely fit his or her individual and institutional perspectives. Thus, several information providers might cite the same risk assessment studies yet give quite different impressions of the risk.

These subtle and unexamined influences on the messenger may cause a gap between the provider and receiver and between the message given and the message received. The public may impute to a messenger purposeful distortion of the facts, while in reality the message may be shaped more by unconscious influences. Nevertheless, the public perception of willful distortion undermines trust in the message.

Confusion Introduced by Untrained Messengers

Confusion and doubt may unwittingly be introduced by the messengers themselves during the process of providing risk information to the public. While those making

the risk statement may be expert in their own fields often they are inadequately prepared to talk about toxicological risks or to explain the scientific basis for risk assessments. This may be especially true in the case of local health department officials, who are more often professional engineers than health professionals and do not have the necessary background, training, and knowledge in the chemical risk field to inform the public about the risk. Similar problems arise in the case of a local mayor or county executive (who probably has no training whatsoever in toxicology or health) or the local water department manager (who is an engineer by background). Outside engineering consultants too may be put in a position of talking or writing about risk, even though they have no background in risk assessment, toxicology, or public health.

If messengers are untrained in toxicology, the uncertainty aspect of risk may be totally ignored: Many officials talk as if there is no uncertainty whatsoever. Another untrained-messenger problem is that the local official may take a personal position with respect to the water's safety, which is then communicated to the public. For example, one mayor apparently decided on his own that the chemicals in the water posed such a minute health risk that there was nothing to worry about. So at the conclusion of a news conference to "inform" the public about the newly discovered water problem, he held up a glass of village water, saying, "I don't see anything wrong with this water," and then drank it down in one confidence-exuding gulp.

The Message

Just as there are usually multiple messengers, so also there may be more than one message being transmitted about the risk. And just as there are both official and unofficial messengers, so too there are both official and unofficial messages. There are, in addition, intended and unintended messages and verbal and nonverbal messages. The interplay of these various messages will affect the way any single risk message is accepted and interpreted.

Characteristics of Official Risk Messages

We have found that certain characteristics inherent in official risk messages may interfere with their reception. Especially relevant characteristics are (1) simplification of technical information; (2) uncertainty in risk assessment; and (3) the aggregate nature of risk messages.

Simplification of technical, especially toxicological, information for public presentation often leads to undue concentration on a single health effect, presenting the risk in terms of only one of the several possible effects. Quite frequently the risk mentioned is cancer, but occasionally it is one of the more dramatic immediate health effects. For example, in one community with nitrate contamination, the state health department and the media have consistently stated that nitrate contamination can result in

"blue babies" (methemoglobinemia). But this is a community with a high proportion of medical professionals, and these local experts have assured the public that there have never been any blue babies there. As a consequence, the residents have taken the health department's statements about health risks quite lightly, and the community has resisted state-imposed remediation for more than a dozen years. Since the people had been informed mainly about one health effect and since it had not yet occurred, they did not make the connection between nitrates and other health effects that might actually have been occurring. Focusing the risk information on one rather rare health effect seemed to convey an unintended message that there was nothing else to worry about.[14]

Risk information is sometimes oversimplified by the sharp distinctions often made between safe and unsafe contaminant levels. Statements about a health risk are usually phrased in terms of state or federal regulations, such as maximum contaminant levels (MCL). The absolute cut-off between what is allowable and what is legally actionable often leads to misunderstandings: As long as the contaminant level is below the MCL, the water is "safe," but if it is as much as one part per billion above that level, people are considered "at risk." Since contaminant levels in groundwater plumes may fluctuate considerably over time, a water supply could be found unsafe in one testing and safe in the next, despite only a minor change in contaminant level. The fluctuation, combined with a single fixed MCL, makes it difficult for the public to know how to react to information about the risks they may face. Such confusion may undermine the willingness of the public to pay attention to the information that is provided or to trust it.

Uncertainty in risk assessment clouds risk messages presented to the public. A perceived lack of clarity in many risk messages is partly due to the inherent nature of risk assessment and toxicology, where extrapolation from animals to humans, large doses, and "safety factors" introduce a large uncertainty factor. Uncertainty is, therefore, unavoidable in informing the public. In the interests of honesty, it is often necessary for health officials to respond to a questioning public with a frank disclaimer such as "we don't know what this chemical does to humans." This admission of uncertainty often strikes the anxious public as surprising ignorance, evasiveness, or an attempt to hide something from them.

A third characteristic inherent in official risk messages that may interfere with reception is their aggregate or macro nature. Risk information, of necessity, is presented in aggregate terms for a "typical" population.[15] However, our community observations showed that such information may be ignored unless individuals can relate it to their specific locale and to themselves. People invariably raise the question "What does it mean for me? For my children?" ("My second child is always sick. I drank that water when I was pregnant. Could that be the cause of his problems?") In a society where individualism is a basic cultural assumption as well as a dominant value and where the individual is held responsible for his or her own destiny, the individual wants to know "how will it affect me?"[16] The question asked is an individualistic one; the person is seeking a guide for individual action. When an-

swers are given in terms of hypothetical aggregates, they may not be acceptable because they do not mesh with culturally generated expectations and needs. The lack of cultural fit between question and response may cause distrust of the answer.

Unofficial Risk Messages

Messages from other sources—the media, other experts, and nonexperts—often conflict with official risk messages. If an official risk message leaves people unsatisfied, they will seek and pay attention to other messages. Often these other messages come from totally unqualified sources, such as an uninformed media source, the person-on-the-street quoted in the local paper, the water-meter reader, a neighbor, or a relative. These unofficial messages, despite their questionable grounding in toxicology and their patent conflict with official messages, may sometimes find greater acceptance because they respond to the real questions people have and address their concerns more directly, and also because the unofficial messengers may be more trusted than the official messengers. Consider, for example, the message of the salesman offering water-purifying devices. He tells the public—through radio and newspaper ads, evening telephone calls, and flyers placed on car windshields around town—that local residents should be concerned about the "poison chemicals" in the water that may cause cancer in them and their children, and that there is no way that their government can or will protect them from these "deadly chemicals" that pass unseen and untasted from our water faucets into our bodies. Then comes the punch line: "You can protect yourself and your family by purchasing a home water filter from my company." In this kind of campaign, which is a highly successful sales tactic, the "information" transmitted about the risk is that the chemicals in the water are likely to cause cancer in anyone who ingests them. Against this simplistic and frightening message, with its simultaneous suggestion of a feasible solution that a responsible individual can provide for oneself, the official risk message, couched as it must be in terms of probability, uncertainty, and aggregate figures, has little impact in the minds of local residents.

Unintended Risk Messages

Unintended messages about a risk often accompany and may contradict official messages. Mixed messages and conflicting messages occur because providers of information are not aware that communication of risk involves not only verbal (oral and written) messages but also behavioral or nonverbal messages. Our interviews make it clear that what official messengers do (or do not do) may be at least as important as what they say or write. In several cases, we found that officials told a community not to worry but then sent in technicians dressed in "moonsuits" to gather soil samples from an area where children usually play. The wearing of moonsuits, a requirement of the Occupational Safety and Health Administration, was not explained to residents, leaving them to doubt the official statement that they need not worry. The frightening behavioral signals contradicted the calm of the verbal message.

It also appears that inactions may speak louder than words. In some cases the seemingly endless number of lengthy and expensive studies and investigations of the groundwater problem, rather than quick action to remedy the situation, may heighten people's anxiety about a risk that was described to them as relatively serious; they worry that, while the studies are being conducted, they are still being exposed to the risk. However, in other cases the slow pace of official investigations may lead people to conclude that the risk must be quite minimal. In one community where an agency representative said there was an "imminent health hazard," the agency's failure to act in a timely manner contradicted its verbal message. As a mayor remarked, "If there really was a health problem, they would have closed us down years ago." Similarly, time delays in processing water test samples and informing local officials of the results are an unintended message that may contradict intended messages.

Conclusion and Implications

This analysis of our research findings in actual risk situations sheds light not only on the complexities of risk communication but on the extremely important role played by the receiver of the information, a role too often ignored. Our observations have significant implications for ways in which risk communication might be more effectively carried out. Above all, they indicate that improved risk communication is not simply a matter of tinkering with the wording of the risk message. No matter how accurate it is, risk information may be misperceived or rejected if those who give information are unaware of the complex, interactive nature of risk communication and the various factors affecting the reception of the risk message.

Our receiver-oriented focus on risk communication actually occurring in communities with toxic chemical contamination problems has highlighted several overall points that should be kept in mind:

1. Reception of information about risk will vary from community to community, among various publics within any community, and through time. People's acceptance of the risk information they are given, while clearly affected by their attitudes about the risk itself, is also affected by the local context in which the risk situation is embedded. In addition, people perceive the message and the messenger as closely related: If the messenger is distrusted, the message may also be distrusted, no matter how accurate it may be.

2. Receivers bring cultural assumptions and inputs of individual knowledge and experience to the communication interaction. The receiver inputs will act as filters, making it unlikely that there will be a one-to-one correspondence between the message transmitted and the mes-

sage actually received. What is said is not necessarily what is heard, and what is "correct" is not necessarily what is believed.

3. Many messengers, both official and unofficial, are involved in presenting information to the public about a given risk. Lack of training and understanding of toxicology by most participants in risk communication may compound the problems of translating, conveying, and understanding highly technical risk information

4. Risk communication involves many risk messages. Frequently, unofficial or unintended messages may conflict with the official, intended message, causing interference with its reception.

Our research findings emphasize that risk communication should be looked at not only in terms of how accurate, detailed, or intelligible the information is but also in terms of how the information will be interpreted. Receivers of risk information are not just empty receptacles to be filled with simplified technical information about health risks but rather play a critical, interactive role in the process of risk communication.

Notes

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